

SMOLT MONITORING AT FEDERAL DAMS

8401400

SHORT DESCRIPTION:

Monitor migration of juvenile salmon and steelhead at Bonneville and John Day Dams.

SPONSOR/CONTRACTOR: NMFS

National Marine Fisheries Service

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SUB-CONTRACTORS:

Pacific States Marine Fisheries Commission

GOALS

GENERAL:

Supports a healthy Columbia basin, Increases run sizes or populations, Adaptive management (research or M&E), Program coordination or planning

ANADROMOUS FISH:

Research, M&E

NPPC PROGRAM MEASURE:

5.9A.1

BIOLOGICAL OPINION ID:

NMFS BO RPA Sec. 13a

TARGET STOCK

All salmon in Columbia

LIFE STAGE

Smolt

MGMT CODE (see below)

(P) and (L)

BACKGROUND

STREAM AREA AFFECTED

Stream name:

Columbia and Snake Rivers

Subbasin:

Columbia Basin

Stream miles affected:

all

Hydro project mitigated:

John Day Dam, Bonneville Dam

Habitat types:

mainstem

HISTORY:

This project was established to monitor mainstem fish passage by collecting and reporting real-time smolt monitoring data to the Fish Passage Center to improve scientific information with which to base in-season flow and spill management decisions in the Snake and Lower Columbia River. In the 1980s this NMFS project conducted the smolt monitoring at federal dams in the Snake and Columbia Rivers (i.e. Lower Granite, Lower Monumental, McNary, John Day, and Bonneville Dams). In the early 1990s the smolt monitoring at Snake River dams and McNary Dam was assumed by non-federal entities (i.e. mainly the states of Washington and Oregon) and this project continued the smolt monitoring at John Day, The Dalles (1989, 1990, and 1991) and Bonneville dams. John Day and Bonneville are unique in that they provide the only hourly dam passage (diel) information in the Smolt Monitoring Program.

BIOLOGICAL RESULTS ACHIEVED:

Progress is measured by noting whether or not we are obtaining the necessary data. An evaluation of the effectiveness of downstre

am migration protection actions is contained in the annual reports of the FPC. The FPC reports analyze and synthesize the information from this project together with the information collected by all other SMP projects and other environmental information. Progress is measured by comparing the results of these reports over the years.

This project has been in place since 1984 and will continue indefinitely as part of the annual coordinated regional SMP. The project can undergo regional, technical peer review. Unique diel aspect of this project provides species specific fish behavior information regarding dam passage. Another advantage of hourly sampling is that there is virtually no delay to migrating smolts. Also, in 1995 PIT tag detections were useful in calculating survival estimates and since 1993 at John Day and 1995 at Bonneville, enabled us to collect fish specific condition information from PIT tagged sample fish.

PROJECT REPORTS AND PAPERS:

Monitoring data is sent daily during the migration season to the Fish Passage Center for input into realtime in-season water management decisions. A series of quarterly and annual reports under the title "Monitoring of Downstream Salmon and Steelhead at Federal Hydroelectric Facilities" have and continue to be produced by this project. The BPA publication numbers for the Annual Report series follow:

Annual Report 1984 November 1984; Annual Report 1985 DOE/BP-20733-1 May 1986; Annual Report 1986 DOE/BP-20733-2 March 1987; Annual Report 1987 DOE/BP-20733-3 May 1988; Annual Report 1988 DOE/BP-20733-4 May 1989; Annual Report 1989 DOE/BP-20733-5 February 1990; Annual Report 1990 DOE/BP-20733-6 March 1991; Annual Report 1991 DOE/BP-20733-7 April 1992; Annual Report 1992 DOE/BP-20733-8 May 1993; Annual Report 1993 DOE/BP-20733-9 April 1994; Annual Report 1995 (in-press).

"Seasonal and Diel Passage of Juvenile Salmonids at John Day Dam on the Columbia River" by D.A. Brege, R.F. Absolon, R.J. Graves., North American Journal of Fisheries Management.

ADAPTIVE MANAGEMENT IMPLICATIONS:

Data generated by this project has been and continues to be used to monitor and gauge the timing and magnitude of the smolt outmigration. This information enables managers to formulate System Operational Requests (SOR's) designed to maximize smolt survival by optimizing in river conditions. Smolt monitoring data is also used to calculate survival and travel time estimates used in formulating passage strategies, e.g. to transport or not. Especially useful in 1995 were the PIT tag detections which enabled researchers to calculate survival estimates and evaluate transportation studies, again affecting management decisions regarding flow management and the transportation program.

PURPOSE AND METHODS

SPECIFIC MEASUREABLE OBJECTIVES:

This project provides daily fish capture and condition data, as well as dam operations and river flow data real-time to the Fish Passage Center to improve the scientific information on which to base in-season flow and spill management decisions directed toward improving protection and passage conditions for juvenile salmon and steelhead in the lower Columbia river. This project is providing a historical time series of smolt monitoring information that contributes to a better understanding of the relationship between environmental conditions, smolt migration characteristics, smolt passage survival and adult production. Specifics on the yearly contributions of this project can be found in the reports referenced below.

Future objectives include full bypass PIT tag detection at John Day with the completion of the new sampler, scheduled for September of 1997. At Bonneville, a prototype flat plate PIT tag detection system installed in the first powerhouse bypass channel provided full bypass PIT tag interrogation in 1996 and will continue to operate until the new sampling facility is built at Bonneville. In the 2nd Powerhouse at Bonneville, full bypass PIT tag detection is planned for 1997 and beyond until the new facility is built. All systems should greatly expand the number of PIT tag detections in the lower river.

CRITICAL UNCERTAINTIES:

PIT tagged fish behavior and survival is no different than non-PIT tagged fish. Use of MS-222 has no lasting affect on fish behavior or survival. Fish collection and handling creates acceptably low levels of injury and mortality. Higher river flows result in higher juvenile survival.

BIOLOGICAL NEED:

To reduce juvenile salmonid mortality associated with dam passage and migratory delays by providing real time, species specific data used in spill management, flow augmentation, and research evaluation.

HYPOTHESIS TO BE TESTED:

Since this project is in the maintenance stage, testing a hypothesis does not really apply. However, the hypothesis of the program is that smolt migration travel time can be reduced by increasing flows through spill management and flow augmentation, resulting in greater smolt survival.

METHODS:

Again, since this project is in the maintenance stage it is considered monitoring, not research, so the experimental design is now a work statement. At Bonneville a wedge wire flume is lowered into the bypass channel and fish are diverted into a basket suspended at the end of the inclined screen.

At John Day Dam, an airlift pump system is used in one gatewell. A large rectangular funnel is submerged in a gatewell and aluminum pipe is stacked on top of the funnel apex. Compressed air is injected into the bottom of this aluminum pipe column, causing the water and fish to rise up the pipe and empty into a basket suspended at water level in the gatewell.

This system is scheduled to be replaced by a new sampling facility in 1997. The new facility will sample the entire bypass channel near the outfall. Sample fish will be diverted to the processing area by a series of dewatering screens, separators, and gates. The facility will have full PIT tag interrogation of all fish and diversion by code capability.

Once the sample fish are captured, they are transported to a holding tank and moved from their to the examination trough. The sample fish are identified and evaluated for scale loss. Three times per week fish are examined more closely for detailed condition information, and lengths are taken. A subsample of these fish is examined under a microscope for Gas Bubble disease symptoms.

PLANNED ACTIVITIES

SCHEDULE:

| <u>Planning Phase</u> | <u>Start</u> Sept | <u>End</u> March | <u>Subcontractor</u> |
|-----------------------|-------------------|------------------|----------------------|
|-----------------------|-------------------|------------------|----------------------|

Task Since this project is a monitoring operation, each of these phases is repeated each year. The dates given refer to the planning, implementation and operation of the monitoring operation each year. The task here is to make all necessary arrangements, including budgeting, hiring, repairing equipment, training, purchasing needed supplies, etc.

| <u>Implementation Phase</u> | <u>Start</u> 3/10 | <u>End</u> 3/31 | <u>Subcontractor</u> |
|-----------------------------|-------------------|-----------------|----------------------|
|-----------------------------|-------------------|-----------------|----------------------|

Task Execute all the plans made during the planning phase, and start sampling fish.

| <u>O&M Phase</u> | <u>Start</u> 4/1 | <u>End</u> 10/31 | <u>Subcontractor</u> |
|----------------------|------------------|------------------|----------------------|
|----------------------|------------------|------------------|----------------------|

Task Continue to sample and process data throughout the season.

CONSTRAINTS OR FACTORS THAT MAY CAUSE SCHEDULE OR BUDGET CHANGES:

Possible injury to fish from sampling equipment, dewatering, handling, anesthetizing, etc.

OUTCOMES, MONITORING AND EVALUATION

SUMMARY OF EXPECTED OUTCOMES

Expected performance of target population or quality change in land area affected:

Improved information base for management of hydrosystem operations to improve protection and the passage survival of all Columbia and Snake River anadromous stocks of salmon and steelhead through the FCRPS.

Contribution toward long-term goal:

Improved information base for management of hydrosystem operations to improve protection and the passage survival of all Columbia River anadromous stocks of salmon and steelhead through the FCRPS

Environmental attributes affected by the project:

Mainstem flows could be effected by SOR's.

Changes assumed or expected for affected environmental attributes:

none

Information products:

This project provides daily fish capture and condition data, as well as dam operations and river flow data real-time to the Fish Passage Center to improve the scientific information on which to base in-season flow and spill management decisions directed toward improving protection and passage conditions for juvenile salmon and steelhead in the lower Columbia river. This project is providing a historical time series of smolt monitoring information that contributes to a better understanding of the relationship between environmental conditions, smolt migration characteristics, smolt passage survival and adult production. Specifics on the yearly contributions of this project can be found in the reports referenced below.

MONITORING APPROACH

(See Methods section)

Data analysis and evaluation:

Summarized in an Annual Report.

EVALUATION

Effective SOR requests based on the data generated. (should be red ink)

Increasing public awareness of F&W activities:

Public presentations, school appearances, personal discussions

RELATIONSHIPS**RELATED BPA PROJECT**

9403300 Smolt Monitoring Program coordinated by the Fish Passage Center

RELATIONSHIP

Contributes data to SMP

OPPORTUNITIES FOR COOPERATION:

Project dependent on continued funding and regional support for monitoring information and continued support in the NMFS adaptive management oriented Biological Opinion. Also dependent on issuance of ESA permit.

COSTS AND FTE

1997 Planned: \$500,000

FUTURE FUNDING NEEDS:

| <u>FY</u> | <u>\$ NEED</u> | <u>% PLAN</u> | <u>% IMPLEMENT</u> | <u>% O AND M</u> |
|-----------|----------------|---------------|--------------------|------------------|
| 1998 | \$600,000 | 35% | 20% | 45% |
| 1999 | \$600,000 | 35% | 20% | 45% |
| 2000 | \$600,000 | 35% | 20% | 45% |
| 2001 | \$600,000 | 35% | 20% | 45% |
| 2002 | \$600,000 | 35% | 20% | 45% |

PAST OBLIGATIONS (incl. 1997 if done):

| <u>FY</u> | <u>OBLIGATED</u> |
|-----------|------------------|
| 1984 | \$271,848 |
| 1985 | \$453,376 |
| 1986 | \$562,413 |
| 1987 | \$519,200 |
| 1988 | \$428,000 |
| 1989 | \$943,700 |
| 1990 | \$697,900 |
| 1991 | \$602,800 |
| 1992 | \$1,652,700 |

| | |
|------|-----------|
| 1994 | \$447,400 |
| 1995 | \$700,000 |
| 1996 | \$633,500 |

TOTAL: \$7,912,837

Note: Data are past obligations, or amounts committed by year, not amounts billed. Does not include data for related projects.

LONGER TERM COSTS: Costs should be similar or less than indicated above.

1997 OVERHEAD PERCENT: NMFS portion: 48.7% , PSMFC portion: 15%

HOW DOES PERCENTAGE APPLY TO DIRECT COSTS:

NMFS - of direct labor, PSMFC - of total direct project costs

CONTRACTOR FTE: In 1997: 2

SUBCONTRACTOR FTE: In 1997: 19
